

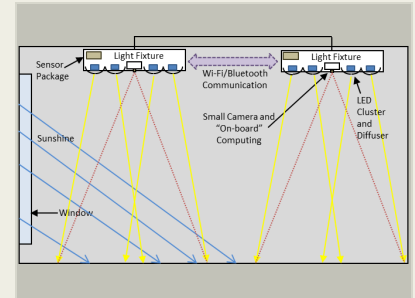
Energy Efficient LED Spectrally Matched Smart Lighting, Phase II

Completed Technology Project (2013 - 2015)



Project Introduction

Innovative Imaging and Research and the University of Houston Clear Lake have teamed to develop a widely extensible, affordable, energy efficient, smart lighting device known as Lambda-Net. Smart building technologies, such as Lambda-Net, are becoming critical to energy savings and sustainability for terrestrial applications and space-based habitats. Our device incorporates a smart-mobile device or other comparable sized integrated computing/sensing device into each LED fixture. Smart-mobile devices are ideally suited to perform energy saving lighting control as they contain inexpensive, mass produced, highly integrated imaging, computing and communication technologies. The low cost digital cameras within these packages become highly capable imaging photosensors using calibration techniques developed for NASA satellites and the commercial remote sensing industry. Novel algorithms utilize lighting information measured by the photosensors to individually tailor the intensity and spectral content of the light generated from each LED fixture within the lighting system to reduce energy usage, increase lighting efficacy and improve circadian rhythm influenced activities such as sleeping and concentration. Advanced spatially distributed occupancy sensing and lighting control further reduces energy usage. Integrating sensing and computing into each light fixture also provides the infrastructure to create a robust sensor network. Network communication is achieved through Wi-Fi, Bluetooth and other communication means, such as the power lines that provide electricity to each fixture. This resulting sensor network enables a wide range of terrestrial and space-based applications including monitoring: building/habitat temperature, humidity and air quality; occupant health and safety; building/habitat space utilization and astronaut activity including deep space adaptation in addition to providing high quality spatially selectable, spectrally programmable illumination.



Energy Efficient LED Spectrally Matched Smart Lighting Project Image

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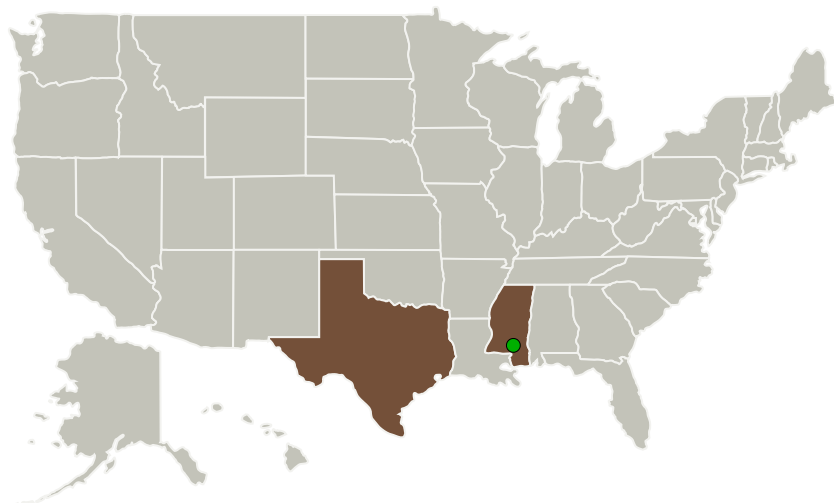
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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Innovative Imaging and Research Corporation	Lead Organization	Industry Women-Owned Small Business (WOSB)	Stennis Space Center, Mississippi
● Stennis Space Center(SSC)	Supporting Organization	NASA Center	Stennis Space Center, Mississippi
University of Houston-Clear Lake	Supporting Organization	Academia	Houston, Texas

Primary U.S. Work Locations

Mississippi	Texas
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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Innovative Imaging and Research Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Robert E Ryan

Co-Investigator:

Robert E Ryan

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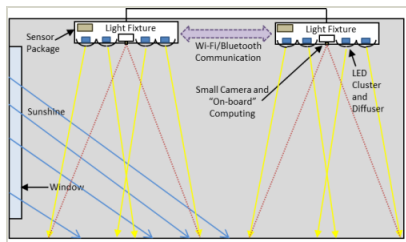


Project Transitions

July 2013: Project Start

December 2015: Closed out

Images



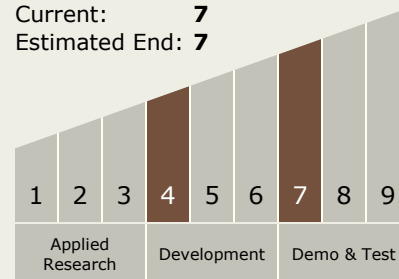
Project Image

Energy Efficient LED Spectrally Matched Smart Lighting Project Image

(<https://techport.nasa.gov/image/137165>)

Technology Maturity (TRL)

Start: **4**
Current: **7**
Estimated End: **7**



Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.3 Human Health and Performance
 - └ TX06.3.6 Long Duration Health

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System